

WHAT IS CLAIMED IS:

1. A vehicle steering control system for a vehicle of the type wherein a steering angle to be given to a wheel steering shaft is determined in dependence on a steering angle given to a handle shaft for steering operation and the driving state of said vehicle so that said wheel steering shaft is rotationally driven by a steering shaft drive motor to be given said determined steering angle, said control system comprising:

a current sensor for detecting a current applied to said steering shaft drive motor;

a motor rotational speed detection section for detecting the motor rotational speed of said steering shaft drive motor;

current inference means for inferring the motor current applied to said steering shaft drive motor based on the motor rotational speed detected by said motor rotational speed detection section;

abnormal judgment means for comparing said current inference value obtained by said current inference means with a current detection value indicated by the output of said current sensor and for judging whether said current sensor is normal or not, based on the result of the comparison; and

abnormal judgment output means for outputting the result of the abnormal judgment when said current sensor is judged to be abnormal.

2. A vehicle steering control system as set forth in Claim 1, wherein said handle shaft and said wheel steering shaft are mechanically separated; and wherein said system further comprises:

a lock mechanism switchable between a lock state that said handle shaft and said wheel steering shaft are locked bodily rotatably to directly transmit a manual steering force given to said handle shaft to said wheel steering shaft and an unlock state released from said lock state; and

lock control means for bringing said lock mechanism into said lock state and for discontinuing the operation of said steering shaft drive motor when receiving the

judgment result from said abnormal judgment output means representing that said current sensor is abnormal.

3. A vehicle steering control system as set forth in Claim 1, wherein motor operation restraining means is further provided for restraining the application of electric current to said steering shaft drive motor based on the current detection result from said current sensor, and wherein said motor operation restraining means uses said current inference value obtained by said current inference means in substitution for said current detection value from said current sensor when receiving the judgment result from said abnormal judgment output means representing that said current sensor is abnormal.

4. A vehicle steering control system as set forth in Claim 1, wherein:

said current sensor detects said motor current value based on the voltage across a shunt resistance which is provided on a path leading from a vehicle-mounted battery constituting the power supply for said steering shaft drive motor to a driver for said steering shaft drive motor; and

said current inference means calculates said current inference value based on a power supply voltage to said steering shaft drive motor, an inner resistance of said steering shaft drive motor and a back electromotive force calculated from said motor rotational speed.

5. A vehicle steering control system as set forth in Claim 4, wherein said steering shaft drive motor is to be operated under the PWM control; and wherein said current inference means calculates said current inference value ( $I_s'$ ) by the following equation:

$$I_s' = \{ (V_s \times \eta - C_{re} \times N) / R_m \} \times \eta$$

where  $\eta$  : duty ratio in the PWM control

$V_s$ : power supply voltage for said steering shaft drive motor

$R_m$ : inner resistance of said steering shaft drive motor

$N$ : rotational speed of said steering shaft drive motor, and

$C_{re}$ : back electromotive force of said steering shaft drive motor.

6. A vehicle steering control system as set forth in Claim 4, wherein:

said steering shaft drive motor is to be operated under the PWM control;

said driver for said steering shaft drive motor is connected to receive as the power supply voltage ( $V_s$ ) the voltage from said vehicle-mounted battery without through a stabilized power supply circuit;

a steering control section for controlling the operation of said steering shaft drive motor includes a power supply voltage detection means for detecting said power supply voltage ( $V_s$ ) and duty ratio determination means for determining the duty ratio ( $\eta$ ) in said PWM control in dependence on the detection value of said power supply voltage ( $V_s$ ); and

said current inference means calculates said current inference value ( $I_s'$ ) based on the detection value of said power supply voltage detected by said power supply voltage detection means.